

# WORKING PAPERS



## PRODUCT MARKET STRUCTURE AND THE CYCLICAL VARIABILITY OF WAGES

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## I. Introduction

Recent discussion in the literature has emphasized the microeconomic impact of "market power" on macroeconomic wage and price inflation. A not uncommon notion is that industrial firms with "market power" engage in a different sort of wage payment behavior than do firms with less market power. Oligopoly firms with more "market power" tend to pay higher wages than firms with less "market power," and although this differential may not increase in the long run over time, it does expand and compress over the business cycle. It widens in recessions and narrows in expansions because wage rates in industries where firms have market power increase rather steadily over time whereas wage rates in more nearly "competitive" industries increase rather more unevenly over time, lagging behind in recessions and ratcheting upwards to "catch up" in expansions. This phenomenon, in various ways it is argued, may foster or reflect a general wage inflationary bias that concentrated market structures contribute to the macro-economy. 1/

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1/ For a theoretical discussion of why firms in concentrated oligopolies might want to pay a wage premium, why they would desire cyclical wage stability, and how this might contribute to inflation, see Ross and Wachter (1973), Scherer (1974), and Greer (1975). Some writers emphasize the independent role of labor union power or the interaction between union power and concentrated industry product market power. Unfortunately, unionization data are not presently available at the four-digit industry level with which to test for a separate effect of union strength. Since

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For the most part, the recent literature has emphasized theoretical discussion concerning the ways in which this wage behavior might contribute to inflation. The fundamental assumption (or hypothesis)--that wages are cyclically less flexible in less competitive industries than is the case in more competitive industries--has not been subjected to intensive empirical test.

There have been a couple of empirical studies that bear on the question. Wachter (1970) investigated the cyclical variability of the differentials between "high" wage industries and "low" wage industries. Annual observations on average hourly earnings across two-digit industries were utilized.

Greer (1975), with contractual wage data for fourteen firms over 1954-1970 taken from Hamermesh (1972), investigated a similar wage ratchet phenomenon, and its cyclical relationship to the degree of seller concentration in the industries in which the firms operated.

The findings in both these studies appear to be consistent with the concentrated industry - cyclical wage stability hypothesis.

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1/ (Continued)

there appears to be a positive correlation between unionization and industrial concentration, our results discussed below, as they turn out, might be regarded as relevant to either the product market power version or the union power version of the hypothesis, or to a combination of both.

The purpose of this note is to present the results of a direct test of the hypothesis.

## II. THE DATA, THE MODEL, AND EMPIRICAL FINDINGS

Annual observations on average hourly earnings for each industry in a selected sample of seventy-nine SIC four-digit industries were calculated over 1958 to 1970.

The primary sample selection criteria were: (1) SIC industry definitional comparability over time, (2) high degrees of industry data specialization and coverage, and (3) reasonable correspondence between SIC industry definitions and economically meaningful market definitions. In a few cases the third criterion was violated when it was thought that the industry concentration ratio could be adjusted to reflect concentration in more meaningfully defined markets. (The sample of industries, their concentration ratios - as adjusted where necessary - and the estimated heights of barriers to entry are listed in an appendix, available on request from the author.)

Average hourly earnings was calculated from Census of Manufactures and Annual Survey of Manufactures data as total annual production worker "Wages" divided by total annual "Production worker manhours."

A series on average hourly earnings differs from contract wage rates in that the former includes whatever overtime premiums were paid, whereas the latter presumably would not. One can argue, on theoretical grounds, that average hourly

earnings is not inferior to stated wage rates as a proxy for labor "price" in interindustry labor market studies. In any event, nothing like an index of contract wage rates exists at the four-digit industry level of aggregation.

The statistical approach used here to test for differential cyclical wage behavior was, first, for each industry, to regress the logarithms of annual average hourly earnings against time to calculate a log-linear time trend. And second, to investigate the cross-sectional relationship between market structure and the residuals of average hourly earnings from trend for business cycle trough and peak years.

Industry average wage rates may exhibit different time trends in different industries as a result of differences in technological change among industries and resulting differential changes in intra-industry labor skill mixes. Of importance to the cyclical stability hypothesis is the cyclical variability of wages around secular trend, not the trend effect itself.

The judgment to use log-linear trends rather than linear trends reflects two factors: (1) wage rates should probably be expected to trend at percentage rates of change rather than absolute rates of change, and (2) with logs, all the residual variation around trend is automatically adjusted for interindustry variation in the absolute magnitudes of hourly earnings. In effect, the residuals are in percentage terms.

Beginning and end years, 1958 and 1970, were chosen to avoid data gaps prior to 1958 and to exclude the recent (post-1971) wage controls period. Fortunately for our analysis, beginning and end years represent similar business cycle stages.

1958 and 1970 were NBER trough years and, according to Stigler and Kindahl (1970), 1966 was a peak year. The cyclically stable administered wage hypothesis presumably would predict that in recession years such as 1958 and 1970, average hourly earnings in less concentrated industries should be compressed more, relative to their trends, than in more highly concentrated industries. For a peak expansion year such as 1966, the hypothesis predicts that average hourly earnings in less concentrated industries should be expanded more, relative to trend.

In order to test this, the following three cross-sectional regressions were estimated.

$$\begin{aligned}
 (1) \quad LWRR58 &= 6.687 - .067(CR4A) - .105(HB) + .016(MB) + \\
 &\quad (6.746) \quad (-3.966) \quad (-.101) \quad (.022) \\
 &\quad .559(CG) - .407(ND) - .381(LYE) + e \\
 &\quad (.835) \quad (-.467) \quad (-.393) \\
 F &= 4.13 \qquad R^2 = .26
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad LWRR66 &= -4.700 + .048(CR4A) - 1.549(HB) + .162(MB) + \\
 &\quad (-3.593) \quad (2.143) \quad (-1.130) \quad (.163) \\
 &\quad .131(CG) - .333(ND) - .469(LYE) + e \\
 &\quad (.148) \quad (-.289) \quad (-.367) \\
 F &= 1.16 \qquad R^2 = .09
 \end{aligned}$$

$$\begin{aligned}
 (3) \quad \text{LWRR70} &= 2.469 + .005(\text{CR4A}) + 1.574(\text{HB}) + .767(\text{MB}) - \\
 &\quad (2.518) \quad (.281) \quad (1.530) \quad (1.030) \\
 &\quad .327(\text{CG}) - .086(\text{ND}) + .587(\text{LYE}) + e \\
 &\quad (-.494) \quad (.100) \quad (.613) \\
 F &= .78 \qquad R^2 = .06
 \end{aligned}$$

Here, LWRR58, LWRR66, and LWRR70 are the residuals of average hourly earnings from trends (the differences between actual and estimated trend values) for the years 1958, 1966, and 1970 respectively. CR4A is four-firm concentration for the industry; <sup>2/</sup> HB and MB are 0-1 dummy variables for estimated "high" barriers to entry and "medium" barriers to entry respectively; CG and ND are 0-1 variables to split consumer goods from producer goods industries and non-durable goods from durable goods industries respectively; and LYE is a dummy which assumed a value of 1 for those industries which should

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<sup>2/</sup> In a few cases, either the product definition of the SIC four-digit industry was too broad or the "relevant market" was regarded as being local or regional in nature. In these cases the four-firm concentration ratio was adjusted, usually by averaging concentration over component five-digit product classes or averaging over state or regional ratios, so as to reflect concentration in relevant markets more closely. Those industries for which such adjustments were made, and the bases of such adjustments, are indicated in the appendix.

In order to be consistent with the adjusted ratios (five-digit product class ratios are calculated with secondary product contamination excluded), unadjusted ratios were taken from 1967 Census of Manufactures, Concentration Ratios in Manufacturing, Part 2, in which four-digit ratios are calculated on a "product class" Value of Shipments basis with secondary product contamination (and primary product exclusion) excluded. Actually, these ratios seem preferable to the "industry" four-digit ratios (which include secondary product contamination) as a general matter. CR4A is the industry mean of the ratios for 1963 and 1967.

exhibit low short run income elasticities of demand. 3/ (t - ratios are in parentheses.)

HB and MB are entered because some versions of the cyclically stable administered wage hypothesis suggest more stable wage behavior in higher barrier to entry industries. CG and ND are entered because final product demands, and hence derived labor demands, may be cyclically less variable in consumer good and non-durable good industries than in producer good and durable good industries respectively. Similarly, labor demand should be cyclically less variable in industries for which income elasticity of demand is low.

Support for the concentrated industry wage stability hypothesis would be provided by positive and significant coefficients for the concentration term in Regressions (1) and (3) for the trough years of 1958 and 1970 (wages should be higher relative to trend in the more highly concentrated industries than in less concentrated industries, and by a negative and significant coefficient for concentration

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3/ The barrier to entry in each industry was classified as "high," "medium," or "low." Reliance was placed on previous estimates of Bain (1956), Mann (1966), Shepherd (1970), Palmer (1973), and Qualls (1972). Where differences of opinion existed, they were reconciled in accordance with the author's judgment.

Consumer good and nondurable good classifications, with a few exceptions, were taken from the Federal Reserve's Index of Industrial Production. Industries were designated as LYE on the basis of author's guesswork backed up by very low short run expenditure elasticity estimates from Houthakker and Taylor (1970).



term in Regression (2) for the peak year 1966 (wages should be lower relative to trend in the more highly concentrated industries).

Only in the case of Regression (3) does the estimated concentration coefficient display the correct sign for this hypothesis, and in that case the magnitude of the coefficient is very small and the t-ratio is less than .3. In the case of the other two regressions, the coefficients have signs opposite from those predicted by the hypothesis, and the associated t-ratios are high enough to indicate statistical significance at conventional levels. 4/

Why these coefficients should have opposite signs is not immediately apparent. Inspection and analysis of employment and hours per worker variability suggest that it is not an overtime phenomenon nor, probably, a skill mix phenomenon. In any event, it seems clear that the findings conflict with the concentrated industry - wage stability hypothesis and, hence, with the notion that concentrated product market structures thereby contribute to general inflation in the economy.

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4/ None of the other variables appears to be important.

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